

REMARKS

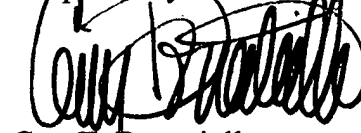
The present invention relates to a skull pin including a removable tip. The tip is formed from an insulating material, preferably a ceramic. Claims 1-8 have been rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 4,612,930 to Bremer. The claims of the present application have been amended, and applicant contends this rejection has thereby been obviated.

The independent claims of the present application have been amended to recite that the protruding portion of the pin tip consists of a cylindrical portion having straight sides and a tapered portion with a rounded tip. Such a configuration is not shown in Bremer. Rather the pin tip of Bremer has a stepped diameter. The tip emerges with a small diameter, and immediately steps to a larger diameter. Rather, the present invention has a straight-sided pin tip. The step in diameter in Bremer creates a stress point at the step, which stress point is absent in applicant's invention. Thus the claims, as amended clearly define over Bremer. Birk in no way remedies this deficiency. Birk shows only a ceramic spacer, without a tapered end.

Accordingly, applicant believes that the invention as set forth in the amended claims is patentable over the cited prior and respectfully requests early and favorable notification to that effect.

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Respectfully submitted,



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In the Specification (Clean Copy as Amended)

Please replace the paragraph bridging pages 5 and 6 with the following:

a1 Referring now to Figure 1, one embodiment of the present invention is shown as skull pin 10 which comprises a pin body 12 and pin tip 14, shown in Figure 2. Pin body 12 is generally cylindrical. Proximal end 22 of pin body 12 includes a bore 13. Distal end 16 of pin body 12 includes a head 18 which has a slot 19 or is otherwise equipped for turning and tightening skull pin 10 through threaded holes in a halo or tong. Pin body 12 includes threads 20 along its exterior so that it can be screwed into such threaded holes in a halo or a tong. Proximal end 22 of pin body 12 has a generally cylindrical bore 13 which is open and can receive pin tip 14. Pin body 12 may be made of any suitably strong material such as titanium. The material for pin body 12 should be suitable for use in an MRI machine (i.e., it should be non-ferrous, non-magnetic). Pin tip 14 is also generally cylindrical. Specifically, the shape of pin tip 14 and bore 13 must match at least insofar as pin tip 14 can fit snugly in bore 13. Pin tip 14 forms the tip of skull pin 10 and is the part of skull pin 10 that comes in contact with the patient's skull. Its diameter is small enough to fit inside bore 13 in pin body 12, but large enough to form a tight fit inside bore 13. Pin tip 14 can be smooth, or can be threaded or splined if desired. Pin tip 14 is made from a strong insulating, non-conducting material such as a ceramic.

Please replace the last paragraph on page 7 with the following:

a2 The angle 36 between the tapered portions 26 is about 40° but can be in the range of about 30° to 50°. The angle must be chosen so that the angle is sufficiently small to be capable of holding the pin in place in the bone of the patient's skull, while not so small

a2 that the pin will break easily. The radius of point 28 is between 0.025 and 0.075 mm, preferably between 0.04 and 0.06, and more preferably about 0.05 mm. The radius is chosen so that pin tip 14 does not slip out of the patient's bone, but yet the tip is structurally strong and stable. The radius can be made larger or smaller than 0.05 mm, providing it meets these conditions.

Please replace the paragraph bridging pages 8 and 9 with the following:

a3 Another embodiment of the ceramic tip of the present invention is shown in Figure 3. In that embodiment, the pin body 12 is not bored at proximal end 22. Instead, the pin tip 23 has a bore 15 to enable it to fit over the pin body. In this embodiment, the pin tip 23 would still comprise a ceramic tip manufactured from the same materials discussed above. However, the overall length of the tip could be reduced considerably. It is most desirable to leave at least about 7.5 mm, preferably at least about 10 mm, and most preferably at least about 12 mm between the skin of the patient and the exposed metal of the pin body. With ceramic cap-type pin tip 23, the pin tip need only be a total length comparable to the exposed portion of insert specified above. That is it is at least 7.5 mm, preferably at least 10 mm, more preferably at least 12 mm. These lengths are not ranges since pin tip 23 can be made longer with little fear of breakage since it gains strength from the metal pin body core. The tip 17 of the cap should be as described above with respect to pin tip 23. That is, pin tip 23 should have a proximal end which comes to a rounded tip 17, which slopes back to the body of pin tip 23 at an angle of between 30° and 50°, preferably about 40°. The radius of the rounded tip 17 of pin tip 23 is between

a3 0.025 and 0.075 mm, preferably between 0.04 and 0.06 mm and more preferably about 0.05 mm.

In the Claims (Clean Copy as Amended)

a4 1. (Amended) A skull pin comprising:

a pin body; and

a pin tip formed from an insulating material, protruding from a proximal end of said pin body; wherein the protruding portion of said pin tip consists of a straight-sided portion and a tapered portion with a rounded tip.

2. The skull pin of claim 1, wherein said insulating material is a ceramic material.

3. The skull pin of claim 1, wherein said insulating material is an electrical insulator.

4. The skull pin of claim 1, wherein said pin body includes a bore for receiving said pin tip.

5. The skull pin of claim 1, wherein said pin tip includes a bore for receiving said pin body.

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a5 6. (Amended) The skull pin of claim 1, wherein the tapered portion has an angle between 30° and 50°.

7. (Amended) A kit comprising:

a halo; and

a skull pin, wherein said skull pin comprises

a pin body, and

an insert formed from an insulating material, protruding from a distal end

a5
of said pin body wherein the protruding portion of said insert consists of a straight-sided portion and a tapered portion with a rounded tip.

8. The kit of claim 7 wherein said insulating material is a ceramic.

9. (Amended) A kit comprising:

skull tongs; and

a skull pin, wherein said skull pin comprises

a pin body, and

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an insert formed from an insulating material, protruding from a distal end of said pin body wherein the protruding portion of said insert consists of a straight-sided portion and a tapered portion with a rounded tip.

10. The kit of claim 9 wherein said insulating material is a ceramic.

11. (New) The pin of claim 1 wherein said straight-sided portion is cylindrical.

a7
12. (New) The kit of claim 7 wherein said straight-sided portion is cylindrical.

13. (New) The kit of claim 9 wherein said straight-sided portion is cylindrical.

14. (New) The kit of claim 7 wherein the tapered portion has an angle between 30° and 50° and 50°.

15. (New) The kit of claim 9 wherein the tapered portion has an angle between 30° and 50° and 50°.